Design of Flexible Planar Antennas using Substrate Gap Structure for Surface Wave Reduction

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ABSTRACT

A flexible planar antennas using substrate gap structure (SG) technique to improve the performance of planar antennas in terms of reduces the reflection coefficient and the backward radiation are presented. Two types of probe-fed microstrip patch antennas are studied using FEKO software to quantify its contributions in terms of surface wave reduction, which is expected to results in reduces the reflection coefficient and the backward radiation. The choice of the microstrip patch antenna is due to its design simplicity, ease of fabrication and integration of the SG element. Simulations indicated that this technique enabled the improvements of reflection coefficients up to -32.27, 25.52 and -28.02 dB operating in the band 5.56, 6.11 and 8.73 GHz respectively. Besides that, the backward radiation is reduced to 7.28 and 27.2 dB at them resonant frequencies 3 and 7.11 GHz respectively.

KEYWORDS

Planar antennas, surface wave, substrate gap (SG) method, reflection coefficient reduction, microstrip antenna

REFERENCES

[1] A. Mahesh, K. S. Shushrutha and R. K. Shukla, "Design of multi-band antennas for wireless communication applications," in IEEE Applied Electromagnetics Conference (AEMC), Aurangabad, India, 2017. doi:10.1109/AEMC.2017.8325718.

[2] R. V. Sravya and R. Kumari, "Gain enhancement of patch antenna using L-slotted mushroom EBG," in Conference on Signal Processing And Communication Engineering Systems (SPACES), Vijayawada, India, IEEE. doi: 10.1109/SPACES.2018.8316311.

[3] B. Mohamadzade and M. Afsahi, "Mutual coupling reduction and gain enhancement in patch array antenna using a planar compact electromagnetic bandgap structure," IET Microwaves, Antennas & Propagation, vol. 11, no. 12, pp. 1719 - 1725, 2017. doi: 10.1049/ietmap.2017.0080.

[4] C. Balanis, Antenna theory: analysis and design, 2nd ed., John Wiley & Sons, 2005.

[5] F. Yang and Y. Rahmat-Samii, "Mutual coupling reduction of microstrip antennas using electromagnetic band-gap structure," in IEEE Antennas and Propagation Society International Symposium. 2001 Digest. Held in conjunction with: USNC/URSI National Radio Science Meeting (Cat. No.01CH37229), Boston, MA, USA, USA,
2001. doi: 10.1109/APS.2001.959765.

[6] …